

TAXONOMY AND BIOGEOGRAPHY OF WEEVILS OF THE GENUS
SIBINIA GERMAR (COLEOPTERA: CURCULIONIDAE)
ASSOCIATED WITH *PROSOPIS* (LEGUMINOSAE:
MIMOSOIDEAE) IN ARGENTINA

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Abstract.—Five species in the *sulcifera* group of the genus *Sibinia* Germar occur in the semiarid Monte and Chaco biotic provinces of Argentina and have hosts in the plant genus *Prosopis* (Leguminosae). *Sibinia asulcifera* Clark, newly recorded from *P. argentina*, *P. flexuosa*, and *P. torquata* and *S. concava* Clark, now known from *P. flexuosa*, *P. nigra*, and *P. alba*, are confirmed as a seed-bud predator microsympatric pair. Three Argentine species, *S. mastuerzo* from *P. strombulifera*, *S. tintitaco* from *P. torquata*, and *S. algarobilla* from *P. seriacantha* are newly described. A key to the Argentine *sulcifera* group members is presented, and the position of the new species in a modified version of a previously reconstructed *sulcifera* group phylogeny is discussed. Zoogeography of the group is considered in light of various hypotheses put forth to explain similarities in the floras of the disjunct arid regions of North and South America. The *sulcifera* group is apparently unusual among animals associated with plants in these areas in having closely related species in both regions.

This paper is based on a study of 17 specimens of the weevil genus *Sibinia* sent to the United States National Museum of Natural History (USNM) for identification by Hugo Cordo of the U.S. Department of Agriculture. The specimens were collected in western Argentina, in the Monte and Chaco phytogeographic provinces, as part of an effort to find agents for biological control of *Prosopis*. In view of the current interest in *Prosopis* as an important component of New World desert ecosystems (Simpson, 1977) and *Prosopis*-associated insects, both from the standpoint of their natural history and ecology (Kingsolver et al., 1977), and as potential biological control agents in North America (Ward et al., 1977), it is desirable to review what is known about *Prosopis*-associated species of *Sibinia*.

Five species of *Sibinia*, all members of the *sulcifera* group of the subgenus *Microtychius*, are represented in the series collected by Cordo. Two

of the species, *S. asulcifera* Clark and *S. concava* Clark, have been described (Clark, 1978). The other three are described for the first time herein. The specimens were collected on six different species of *Prosopis*: *P. argentina* Burkart, *P. flexuosa* de Candolle, *P. nigra* (Grisebach) Hieronymus, and *P. seriacantha* Hooker and Arnott of the section *Algarobia*, and *P. strombulifera* (Lamarck) Benthams, and *P. torquata* (Lagasca) de Candolle of the section *Strombocarpa*.

Although direct information on the life histories of these species of *Sibinia* is not available, it is possible to infer the probable site of larval development of each. The host plants of all of the 127 previously described members of the subgenus *Microtychius* are known to be, or are suspected to be, mimosoid legumes (Clark, 1978). Larvae of some species of *Microtychius* develop in seeds of these plants (seed predators), whereas larvae of others develop in the flower buds (bud predators). Adults of the seed predators are generally easily distinguished from adults of bud predators by their larger size, more prominent structural features, and frequently more distinctive scale patterns. Thus, although the larval developmental site of only one *sulcifera* group member, the bud predator *S. setosa* (LeConte) is known (see Rogers et al., 1975), it is inferred that the *sulcifera* group contains both bud and seed predators.

Another important characteristic of species of *Microtychius* is the frequent synchronous occurrence of individuals of two or more species on the same plant. I refer to this situation as "microsympatry," distinguished from "sympatry," or the occurrence of individuals of different species of *Microtychius* at a given locality on different plant species. In *Microtychius* it is common for individuals of a seed predator to be microsympatric with individuals of one, or sometimes two or more, bud predators. The members of these microsympatric bud-seed predator pairs frequently belong to the same species group, and appear to be limited to one or a few closely related host plant species. These attributes appear to characterize the *sulcifera* group.

With this as background, it is possible to discuss the *sulcifera* group in greater detail. The species descriptions and line drawings were prepared using techniques described previously (Clark, 1978). All 17 of the specimens received from Cordo are deposited in the USNM collection. In addition to locality and host labels, each of the specimens bears a label, presumably affixed by the collector, with a unique combination of numbers and letters. The specimens are referred to by this combination at certain places in the text.

THE *SULCIFERA* GROUP

Members of the *sulcifera* group have the following diagnostic features (modified from Clark, 1978:128): Eyes relatively small, flattened, hind mar-

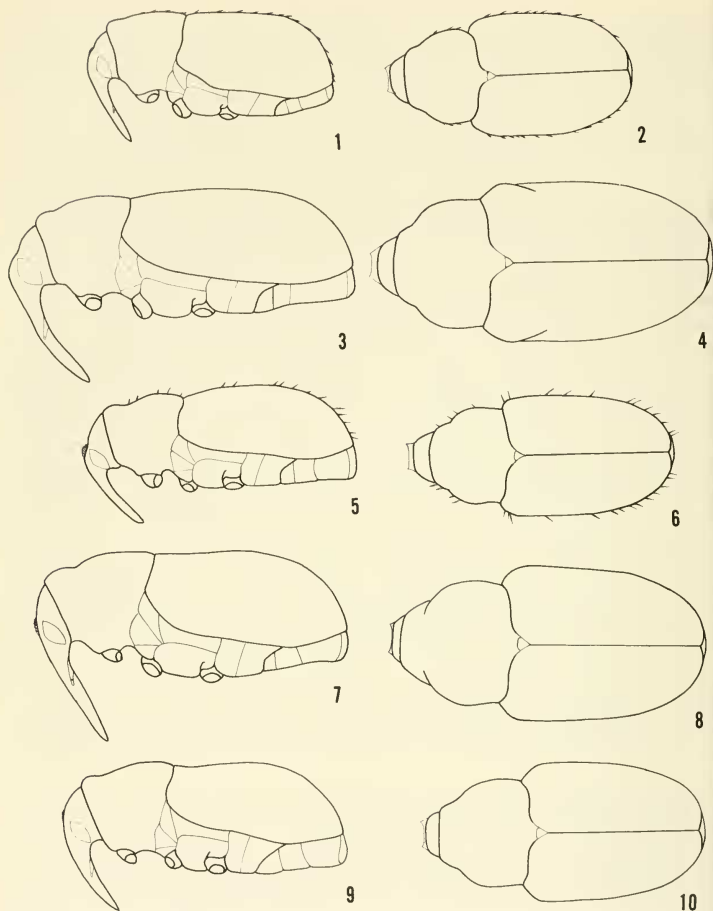
gins not raised; frons distinctly wider than rostrum at base; vertex of head, rostrum, pronotum, elytra, and femora with large, round to subquadrate, imbricated scales which are strongly concave in most species, and with elongate, narrow scales which are erect and acuminate in some species (absent from the pronotum in some).

Four of the nine species in the *sulcifera* group are North American. These are *S. transversa* (Casey) of the southwestern United States, and *S. cuauh-temoc* Clark of southern Mexico, both on *Acacia*; *S. setosa* (LeConte) of the southwestern United States, Mexico, and the West Indies, on *Prosopis* (see Rogers et al., 1975; Clark, 1978:135-137, 140-141), and *S. sulcifera*, presumably of Mexico, but known only from specimens intercepted in quarantine at the U.S.-Mexico border, on unknown host(s). The remaining five species are known only from Argentina. These are *S. asulcifera*, *S. concava*, and three species described herein on *Prosopis*.

The North American *sulcifera* group members are distinguished from each other by the characters in the key to North and Central American *Sibinia* (Clark, 1978). Three of the Argentine species, *S. asulcifera*, *S. tintitaco*, and *S. mastuerzo*, trace to *S. asulcifera* in the key to South American *Sibinia* (Clark, 1978). The other two Argentine species, *S. concava* and *S. algarobilla*, trace to *S. concava* in the same key. The Argentine species are distinguished from each other in the following key:

KEY TO SPECIES OF THE *SIBINIA SULCIFERA* GROUP FROM ARGENTINA

1. Round to subquadrate recumbent scales biseriate on all elytral interspaces; pronotum without elongate narrow scales; narrow scales, if present on elytra, short, recumbent, or raised only slightly on declivities 2
 - Round to subquadrate recumbent scales uniseriate on major portions of even-numbered elytral interspaces; pronotum and elytra with prominent, narrow, attenuate, erect bristlelike scales (Figs. 1-2, 5-6, 19) 4
2. Distal portion of rostrum more or less cylindrical (Figs. 1, 3, 5, 7) ... 3
 - Distal portion of rostrum acuminate (Fig. 9) .. *S. tintitaco*, new species
3. Recumbent scales on pronotum and elytra not or only feebly concave; rostrum nearly straight (Fig. 7); sternum 5 of female abdomen strongly constricted, posteromedian portion distinctly produced ...
 - *S. mastuerzo*, new species
 - Recumbent scales on pronotum and elytra distinctly concave; rostrum curved (Fig. 3); sternum 5 of female abdomen only feebly constricted, posteromedian portion not produced *S. asulcifera* Clark
4. Round to subquadrate recumbent scales uniseriate on even-numbered elytral interspaces; even interspaces devoid of bristlelike scales *S. concava* Clark



Figs. 1-10. *Sibinia* spp., habitus. (1) *S. algarobilla*, female, holotype, lateral view; (2) the same, dorsal view; (3) *S. asulcifera*, female, paratype, Andalgala, Catamarca, Argentina, lateral view; (4) the same, dorsal view; (5) *S. concava*, female, paratype, Andalgala, Catamarca, Argentina, lateral view; (6) the same, dorsal view; (7) *S. mastuerzo*, female, holotype, lateral view; (8) the same, dorsal view; (9) *S. tintitaco*, female, holotype, lateral view; (10) the same, dorsal view.

- Round to subquadrate recumbent scales uniseriate on elytral interspace 4 and on basal portions of interspaces 6 and 8, biseriate on odd-numbered interspaces and on remainder of even-numbered interspaces; even-numbered interspaces with prominent, erect bristle-like scales *S. algarobilla*, new species

Sibinia (Microtychius) asulcifera Clark

Figs. 3, 4

Sibinia (Microtychius) asulcifera Clark, 1978:129. Holotype, ♂, 50 km W Andalgalá, Catamarca, Argentina (USNM).

Diagnosis.—Distal portion of rostrum cylindrical (Fig. 3); concave recumbent scales biseriate on odd- and even-numbered elytral interspaces; odd-numbered elytral interspaces with median row of short, narrow, recumbent scales, these dense and conspicuous on declivities; pronotum without narrow scales.

Description.—See Clark, 1978:129.

Discussion.—This relatively large *Microtychius* is probably a seed predator. Although members of the type-series were collected on non-mimosoid plants (*Cassia* and *Zuccagnia*; Leguminosae, subfamily Caesalpinioideae), it was predicted (Clark, 1978:135) that the weevil would have a *Prosopis* host(s) because of its close resemblance to the *Prosopis*-associated bud predator *S. concava*. The receipt of three *S. asulcifera* specimens collected on *Prosopis* confirms that prediction. Furthermore, the fact that one specimen of *S. asulcifera* (D-457b) and a specimen of *S. concava* (D-457a) bear identical label data is evidence that the two species may, as was also predicted, occur in microsympatry. Another specimen of *S. asulcifera* (D-543) appears to have been taken in microsympatry with the bud predator *S. tintitaco* (D-545a, D-545b). The *Prosopis* spp. on which the *S. asulcifera* specimens were collected belong to two of the six generic sections recognized by Burkart (1940), *Algarobia* and *Strombocarpa*.

The specimens received from Cordo were taken in San Juan Province, at localities and on dates and hosts as follows (see Fig. 22): D-457b. Rt. 40, 39 mi N San Juan City, 26 November 1976, sweeping *Prosopis flexuosa*. D-509. Rt. 40, 51 mi N San Juan City, 26 November 1976, sweeping *Prosopis argentina*. D-543. Rt. 40, 10 mi N Jachal, 27 November 1976, sweeping *Prosopis torquata*.

Sibinia (Microtychius) mastuerzo Clark, NEW SPECIES

Figs. 7, 8, 12, 15

Holotype.—♀, Argentina: Mendoza Province, Rt. 40, 10 mi N Mendoza City, 24 November 1976, sweeping *Prosopis strombulifera*, D-377a. (USNM Type no. 75852).

Paratype.—Same label data as holotype (1 ♀, D-377b).

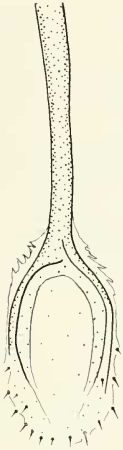
Diagnosis.—Rostrum of female nearly straight, distal portion cylindrical (Fig. 7); recumbent scales on elytral interspaces flat or feebly concave uniformly biseriate; odd-numbered interspaces with median row of short stout, apically blunt scales which are recumbent on dorsum, erect, but inconspicuous on declivites.

Description.—*Length*: 1.86–2.08 mm. *Width*: 0.92–1.06 mm. *Eye*: Height about $1.5 \times$ length. *Frons*: Rounded continuously with head (Fig. 7); scales on sides forming low superocular tuft. *Rostrum*: 0.88–0.94 \times pronotal length; in dorsal view tapered slightly to antennal insertions, subparallel sided to tip; in dorsal profile broadly curved at base, nearly straight from just distad of base to tip; distal portion long, 55–59% of total rostral length, slender, glabrous, smooth. *Prothorax*: Pronotum and pleuron with round to subquadrate recumbent scales only, these not or only slightly concave; white, fulvoferruginous, and ferruginous scales present, white scales forming incomplete, posteriorly-widened dorsomedian vitta, ferruginous scales forming broad lateromedian vittae, posterolateral portions and pleuron with white scales and ferruginous or fulvoferruginous scales intermixed. *Elytra*: Interspaces subequal in width; round to subquadrate recumbent scales not or only feebly concave, broadly imbricated; short, recumbent narrow scales forming irregular mediobasal macula and sutural vitta, intermixed among fulvoferruginous or ferruginous scales on remainder, especially dense laterally and on declivities. *Abdomen*: Median portion of sterna 1–5 feebly convex, sternum 5 strongly constricted subapically, posteromedian portion of segment slightly produced and distinctly flexed downward. *Spiculum ventrale*: See Fig. 12. *Spermatheca*: See Fig. 15.

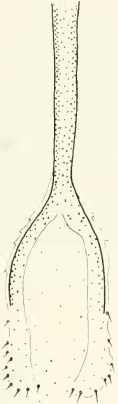
Discussion.—Roughly comparable to *S. asulcifera* in size, *S. mastuerzo* is probably, like that species a seed predator. Its host is *Prosopis strombulifera*.

Etymology.—The name *mastuerzo*, a Spanish vernacular name of the host (Rowell, 1969), is also generally applied to South American members of the section *Strombocarpa* (commonly known as "screwbeans" in North America (Burkart and Simpson, 1977)). The masculine noun stands in apposition to the feminine generic name.

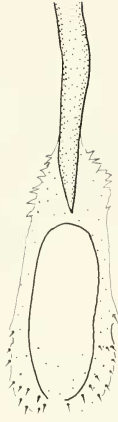
Figs. 11–18. *Sibinia* spp., external genitalia. (11) *S. algarobilla*, paratype, D-690a, spiculum ventrale; (12) *S. mastuerzo*, paratype, D-377b, spiculum ventrale; (13) *S. tintitaco*, paratype, D-545b, spiculum ventrale; (14) *S. algarobilla*, paratype, D-690a, spermatheca; (15) *S. mastuerzo*, paratype, D-377b, spermatheca; (16) *S. tintitaco*, paratype, D-545b, spermatheca; (17) *S. algarobilla*, paratype, D-690b, median lobe of male genitalia, ventral view; (18) *S. tintitaco*, paratype D-640b, median lobe of male genitalia, ventral view.



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12



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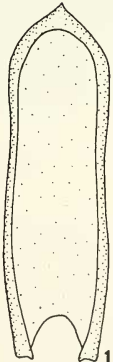
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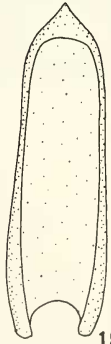
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Sibinia (Microtychius) tintitaco Clark, NEW SPECIES

Figs. 9, 10, 13, 16, 18, 20

Holotype.—♀, Argentina: San Juan Province, Rt. 40, 10 mi W Jachal, 20 November 1976, sweeping *Prosopis torquata*, D-545a (USNM Type no. 75851).

Paratypes.—Argentina: La Rioja Province, Rt. 40, 20 mi NE Pangancillo, 20 November 1976, sweeping *Prosopis torquata* (1 ♀, D-640a; 1 ♂, D-640b); same label data as holotype (1 ♀, D-545b).

Diagnosis.—Distal portion of rostrum acuminate (Fig. 9); recumbent scales biseriate on each elytral interspace; odd-numbered interspaces with median row of short, narrow scales which are feebly raised on declivities; pronotum without such scales.

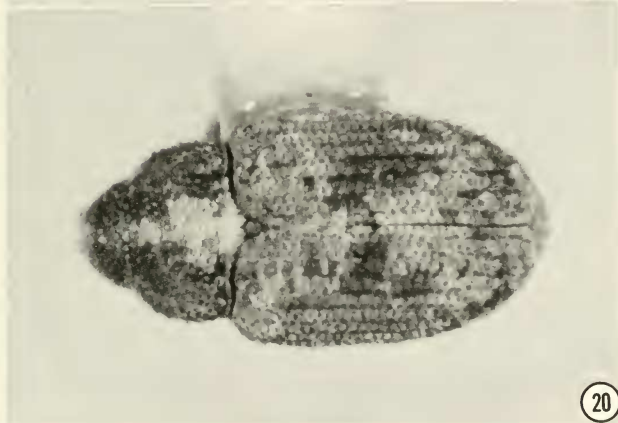
Description.—*Length*: ♂, 1.56 mm; ♀, 1.78–1.82 mm. *Width*: ♂, 0.78 mm; ♀, 0.94–0.96 mm. *Eye*: Height about $1.6 \times$ length. *Frons*: In profile rounded continuously with head; erect scales on sides forming a low but distinct superocular tuft. *Rostrum*: ♂, $0.81 \times$, ♀, $0.82\text{--}0.93 \times$ pronotal length; in dorsal view strongly tapered to antennal insertions, finely acuminate distally, especially in ♀; in dorsal profile, broadly rounded at base, broadly, evenly curved from just distad of base to tip; distal portion in ♂ short, 52% of total rostral length, stout; in lateral view tapered, lateral sulcus obsolete; in ♀, distal portion longer, 58–61% of total rostral length, smooth, shining. *Prothorax*: Pronotum with round, concave, imbricated scales only; white scales present in incomplete, posteriorly-widened dorsomedian vitta which is bounded on each side by broad, irregular vittae of ferruginous scales, the latter darkest on posterior portion; lateral portions of dorsum and pleuron with fulvous and paler whitish scales admixed. *Elytra*: Interspaces subequal in width; recumbent scales on interspaces round to subquadrate, concave, broadly imbricated, biseriate; white, fulvous, and darker ferruginous scales present in irregular pattern; white scales forming broad anteromedian macula and narrower posteromedian macula (Fig. 20); maculae separated by irregular transverse band of ferruginous scales; ferruginous and fulvous scales also variably intermixed mediobasally, elsewhere fulvous and whitish scales intermixed. *Abdomen*: In ♂, sterna 1–4 shallowly, broadly concave medially, sternum 5 more deeply impressed, but not foveate medially; in ♀, subapical constriction of sternum 5 distinct but posteromedian portion of segment not produced. *Median lobe*: See Fig. 18. *Spiculum ventrale*: See Fig. 13. *Spermatheca*: See Fig. 16.

Discussion.—This relatively small *Microtychius* is probably a bud predator of *Prosopis torquata*. It apparently occurs in microsympatry with the seed predator *S. asulcifera*, at least at the type-locality.

The only significant variation noted in the small series examined is in the relative proportion of light fulvous and whitish scales and darker ferruginous scales on the pronotum and elytra.



19



20

Figs. 19–20. *Sibiria* spp., habitus. (19) *S. concava*, paratype, female, Andalgalá, Catamarca, Argentina, dorsal view; (20) *S. tintitaco*, female, holotype, dorsal view.

Etymology.—The name *tintitaco*, a Spanish vernacular name of *P. torquata* (Rowell, 1969; Burkart and Simpson, 1977), is a masculine noun standing in apposition to the feminine generic name.

Sibiria (Microtychius) concava Clark

Figs. 5, 6, 19

Sibiria (Microtychius) concava Clark, 1978:135. Holotype, ♀, 11 km W Las Cejas, Tucuman, Argentina (C. W. O'Brien collection).

Diagnosis.—Distal portion of rostrum cylindrical (Fig. 5); concave recumbent scales biseriate on odd-numbered elytral interspaces, uniseriate on even-numbered interspaces; pronotum and odd-numbered elytral interspaces with prominent, acuminate, erect bristlelike scales, even-numbered interspaces devoid of such scales.

Description.—See Clark, 1978:135.

Discussion.—This relatively small *Microtychius* is probably a bud predator. One of the paratypes (from Las Termas, Santiago del Estero Province, Argentina) was collected on *Prosopis alba* Grisebach. Cordo's specimens were taken on two species of *Prosopis* (listed below), both of them, like *P. alba*, members of the section *Algarobia*. The apparent microsympatry of *S. concava* and the seed predator *S. asulcifera* on *P. flexuosa* is discussed in the section dealing with *S. asulcifera*.

The specimens received from Cordo were collected at the localities on dates and plants as follows (see Fig. 22): D-226. San Luis Province, Rt. 7, 4 mi W San Luis City, 20 November 1976, sweeping *Prosopis nigra*. D-369. Mendoza Province, Rt. 40, 10 mi S Mendoza-San Juan border, 24 November 1976, sweeping *Prosopis flexuosa*. D-457a. San Juan Province, Rt. 40, 39 mi N San Juan City, 26 November 1976, sweeping *Prosopis flexuosa*. D-675. La Rioja Province, Rt. 38, 6 mi SE Patquia, 20 November 1976, sweeping *Prosopis flexuosa*. D-684. La Rioja Province, Rt. 38, 27 mi SE Patquia, 30 November 1976, sweeping *Prosopis flexuosa*.

Sibinia concava is also known from Andalgalá, Catamarca Province (Clark, 1978:135).

Sibinia (Microtychius) algarobilla Clark, NEW SPECIES

Figs. 1, 2, 11, 14, 17

Holotype.—♀, Argentina: La Rioja Province, Rt. 38, 8 mi W border La Rioja-Córdoba, 30 November 1976, sweeping *Prosopis seriacantha*, D-691 (USNM Type no. 75853).

Paratypes.—Same label data as holotype (1 ♀, D-690a; 1 ♂, D-690b).

Diagnosis.—Distal portion of rostrum attenuate, not acuminate (Fig. 1); recumbent scales on elytral interspace 4 and on basal portions of interspaces 6 and 8 uniseriate, otherwise scales biseriate; pronotum and odd- and even-numbered elytral interspaces with prominent, erect, attenuate bristlelike scales; whitish and fulvous scales intermixed on pronotum and elytra.

Description.—*Length*: ♂, 1.78 mm; ♀, 1.60–1.66 mm. *Width*: ♂, 0.88 mm; ♀, 0.84–0.88 mm. *Eye*: Height about $1.4 \times$ length. *Frons*: Rounded separately from head (Fig. 1); erect scales forming a distinct superocular tuft. *Rostrum*: ♂ and ♀, $0.9 \times$ pronotal length; in dorsal view distinctly tapered from base to antennal insertions, slightly narrowed just distad of insertions, then subparallel to tip; in dorsal profile, moderately rounded at base, nearly straight from just distad of base to tip; distal portion of male

rostrum moderately long, 52% of total rostral length, slender, in lateral view slightly tapered, sulci obsolete; in female, distal portion longer, 50–58% of total rostral length, smooth, shining. *Prothorax*: Pronotum with round, concave, imbricated scales, and short, narrow, erect scales intermixed; pleuron with round, recumbent scales only; white scales present in large postero-medial macula on dorsum; a few ferruginous scales present in large posteromedial macula and posterolaterally; fulvous and pale whitish scales intermixed elsewhere; scales on pleuron whitish. *Elytra*: Odd-numbered interspaces slightly wider than even-numbered ones; recumbent scales biseriate on each odd-numbered interspace and on interspace 2 posteriorly, mostly uniseriate on even-numbered interspaces; each odd-numbered interspace and interspace 2 with median row of short, narrow, erect scales; other even-numbered interspaces without erect scales, or these sparse; white, fulvous, and ferruginous scales present in irregular pattern; white scales forming broad anteromedial macula and narrower, posteromedial macula; maculae separated by irregular transverse band of ferruginous scales; ferruginous and fulvous scales also variably intermixed mediobasally, elsewhere fulvous and whitish scales intermixed. *Abdomen*: Sterna 1–4 nearly flat medially in ♂, feebly convex in ♀; sternum 5 of ♂ not depressed medially; subapical constriction of sternum 5 of ♀ obsolete. *Median lobe*: See Fig. 17. *Spiculum ventrale*: See Fig. 11. *Spermatheca*: See Fig. 14.

Discussion.—Like *S. concava*, which it closely resembles, this minute *Microtychius* is most likely a bud predator of its *Prosopis seriakantha* host. In addition to the diagnostic characters listed, *S. algarobilla* is distinguished from *S. concava* by its shorter, stouter body form (cf. Figs. 1, 2, 5, 6).

Etymology.—The name *algarobilla* is one of the vernacular names of the host (Rowell, 1969). It is the diminutive form of algarobo, the vernacular name applied in South America to all *Prosopis* with arched or straight fruits (Burkart and Simpson, 1977), most of which, like *P. seriakantha*, belong to the section *Algarobia*. The diminutive is appropriate for this very small weevil.

PHYLOGENY

In a reconstruction of the phylogeny of the New World species of *Sibinia* (Clark, 1978) five character states were hypothesized to indicate sister group relationships within the *sulcifera* group (numbers as on Figure 443 of that work):

- 23—spiculum ventrale with elongate, broadly forked base;
- 24—elytra with transverse diamond-shaped mediobasal fascia;
- 25—hosts in plant genus *Prosopis*;
- 26—Spermatheca as in Fig. 27 (of Clark, 1978); and
- 27—distal portion of female rostrum elongate, slender, cylindrical, smooth.

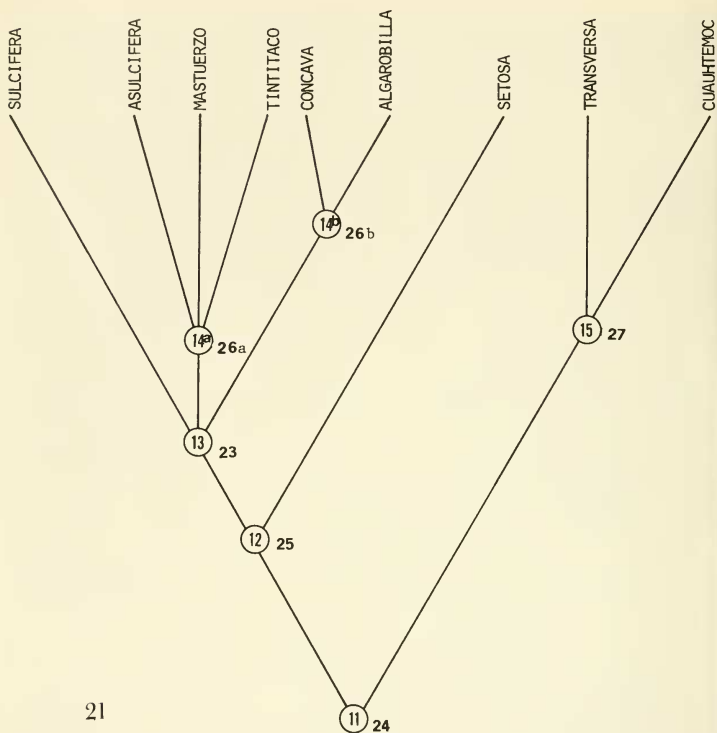


Fig. 21. Cladogram of phylogenetic relationships of *sulcifera* group of genus *Sibinia*. Numbers at nodes designate hypothetical ancestors referred to in the text and in Clark (1978); numbers beside nodes designate apotypic character states referred to in the same places.

A modified, apparently more parsimonious cladogram (Fig. 21), which also depicts relationships of the three new species from Argentina is now proposed. This arrangement requires assumption of loss of apotypic state 24 in *S. sulcifera*, rather than reversal or loss of state 23 in *S. setosa*, *S. transversa*, and *S. cuauhemoc* required by the previously proposed system. Inference of the *Prosopis* host association in ancestor 12 requires assumption that *S. sulcifera* will be found to have a *Prosopis* host. All of the new Argentine species possess apotypic states 23, 24, and 25, but not 26. The latter state is probably a weak indication of relationship, however. Spermathecal shape in *S. asulcifera* and *S. concava* does not really differ greatly

from that in *S. sulcifera* (Clark, 1978, Fig. 26) and in the new Argentine species (Figs. 14–16, herein). Instead, a system based on two additional apotypic states inferred in ancestors 14a and 14b (Fig. 21) is now proposed:

26a—pronotum without elongate, narrow scales, and

26b—round to subquadrate scales uniseriate on major portions of even-numbered elytral interspaces.

No evidence of sister-group relationships among any two of the three different lines depicted as arising from each of ancestors 13 and 14a was found. Further collecting and search for apotypic states in the *sulcifera* group is important and desirable in light of the existence in the group of species in arid regions of both North and South America. The significance of these relationships in view of the amphitropical similarities of the floras of these disjunct regions is discussed below.

BIOGEOGRAPHY

The apparent amphitropical disjunct distribution of *sulcifera*-group members in arid regions of Argentina and North America brings to mind the well-known similarities of the disjunct floras of arid regions of North and South America, particularly the North American Sonoran Desert and the Argentine Monte. This is all the more intriguing because of the *Prosopis* host association of North and South American members of the *sulcifera* group. *Prosopis* is one of the major components of the floras of the arid regions of both continents (see Simpson, 1977). Various theories advanced to explain similarities in the floras of the Sonoran Desert and the Monte were reviewed by Solbrig et al. (1977). These authors concluded that at the family and generic levels the similarities had their origins "in the process of parallel or convergent evolution towards arid adaptations from common or closely related, more mesic ancestors." They cite Raven and Axelrod (1974), however, in describing the hypothesis that similarity in at least one element of the biotas whose relationships are closer than the generic level, the *Larrea divaricata*-*L. tridentata* disjunction, is the result of derivation from a transtropic ancestor which was widespread during periods of greater aridity in Pleistocene time.

Raven (1963) suggested that one line of evidence which could be used to test hypotheses of long-range dispersal of plants against hypotheses of former interconnection between disjunct arid areas of North and South America would be examination of the phylogenetic relationships of insects associated with the plants. He reasoned that if the similarities resulted from former interconnectedness the insects associated with the plants should be related, but that if long range dispersal were involved this probably would not be so. After review and comparison of distribution patterns of several different animal groups in the Sonoran Desert and Monte regions, Solbrig

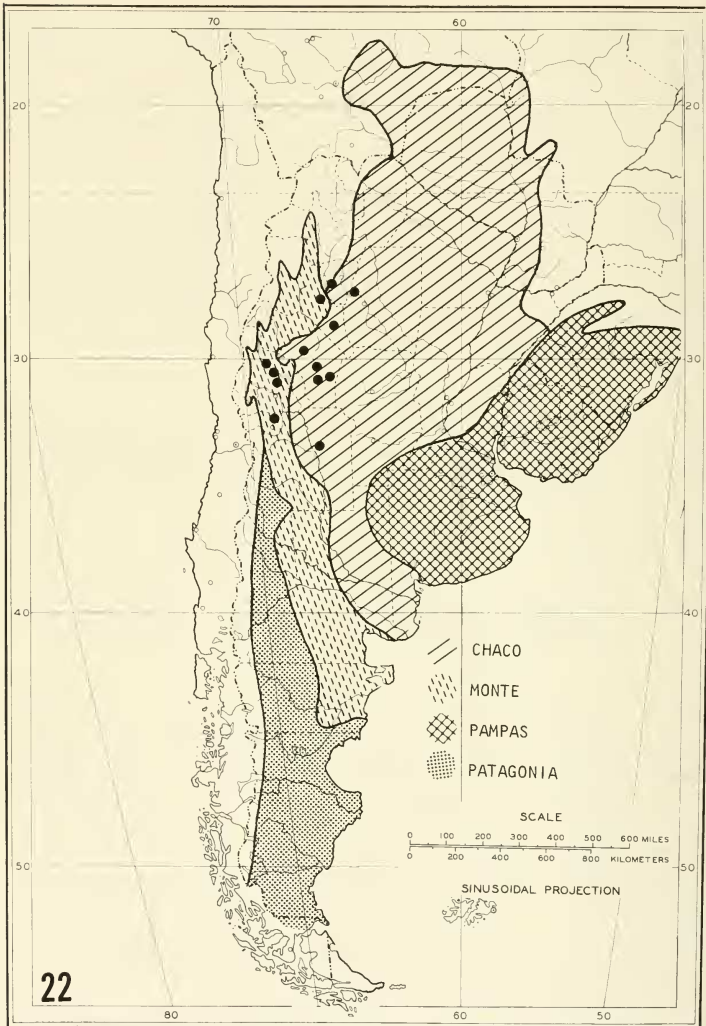


Fig. 22. Map of southern South America showing composite distribution of members of the *sulfifera* group; outline of biotic provinces (redrawn from Blair et al. 1976).

et al. (1977) concluded that the faunas are "much less related phylogenetically" than the floras. Raven and Axelrod (1975) went so far as to state that even when associated with the same sorts of plants, the animals of the two regions are "very different." Hurd and Linsley (1975) concluded that dissimilarity of the bee faunas north and south of the New World tropics, including those associated with *Larrea*, suggests lack of dispersal between the two regions.

A comparable dissimilarity has been described in at least one other group of insects, the seed beetles or Bruchidae. The host associations of these insects are similar to those of *sulcifera*-group members. Stange et al. (1976) noted that bruchids attacking the dominant legume shrubs in the Monte and Sonoran Desert regions (*Acacia*, *Cassia*, *Cercidium*, *Mimosa*, and *Prosopis* spp.) belong to different genera, with the exception of three which are widely distributed throughout the Americas. Kingsolver et al. (1977) emphasized the fact that this distinction also holds for the *Prosopis*-associated bruchids. According to these authors the bruchid species in the two disjunct regions are entirely different. They also state that distinct genera with apparent independent origins have radiated separately on *Prosopis* on the two continents. They do note the existence of two "sister genera" of *Prosopis*-associated bruchids, *Algarobius* of North America, and *Scutobruchus* of South America.

It would appear, then, that occurrence of very closely related members of the same genus of herbivorous insects in the disjunct Sonoran Desert and Monte regions represents an anomolous situation. Such is the case, however, with the *sulcifera* group.

It should be noted that like most animal groups reviewed by Solbrig et al. (1977), the *sulcifera* group contains species which occur outside the limits of the Sonoran Desert and Monte regions. Furthermore, like most of the bruchids reviewed by Kingsolver et al. (1977), some *sulcifera* group members have hosts other than species of *Prosopis*, namely species of *Acacia*. The only North American *sulcifera*-group member known to be associated with *Prosopis*, *S. setosa*, occurs throughout the southwestern United States and on the Mexican Plateau, in the semi-arid Valley of Oaxaca of southern Mexico, and in the West Indies (Clark, 1978). North American *sulcifera*-group members with *Acacia* hosts occur, for the most part, in the same areas of the United States and Mexico, although none is known from the West Indies (Clark, 1978).

Conversely, South American *sulcifera*-group members are known only from *Prosopis* and only from the Argentine Monte and adjacent portions of the Chaco (Fig. 22). Their potential distributions are much more extensive, however. South American *Prosopis* spp. occur throughout the Chaco region of Argentina, Bolivia, and Paraguay, as well as in related plant formations in Uruguay and western Brazil and in the arid inter-Andean valleys of Bo-



Fig. 23. North and South America showing the generalized distribution of the genus *Protopsis* in the New World (redrawn from Simpson and Solbrig, 1977).

livia, Peru, and Colombia. Their ranges thus extend at interrupted intervals throughout the length of the continent. Some also occur in northern Venezuela and along the Pacific Coast of Middle America from the Isthmus of Panama to southern California (Fig. 23). Thus the *sulcifera* group has an almost continuous potential distribution between the regions in which it is now known. Considering the possibility that these arid and semiarid "stepping stones" were more extensive at intervals during the Pleistocene, it seems possible that the apparent disjunction is not and never has been a

reality. If this is so, however, we may wonder about the apparent lack of corollary relationship among the *Prosopis*-associated bruchids.

The paucity of collection records for members of the genus *Sibinia* from much of South America, and especially from the Andean corridor, is regrettable. Further collecting of weevils and bruchids on mimosoids, especially *Prosopis*, in Central and South America is needed. *Prosopis* plants have been sampled at a few stations along the Pacific Coast in Chiapas, Mexico, and in Panama, as well as on the tip of the Yucatan Peninsula, where no *Sibinia* were found. More concerted efforts at different times of the year may change this. Further collecting on *Prosopis* and other mimosoids in the Monte itself, in the Chaco, and particularly along the Andean cordillera, promises to provide valuable evidence which may help answer previously posed questions about *Sibinia* phylogeny (Clark, 1978), and may even shed further light on the history and nature of the floristic similarities of the disjunct arid regions of North and South America.

ACKNOWLEDGMENTS

Thanks are extended to B. B. Simpson and W. N. Mathis (Smithsonian Institution) and J. M. Kingsolver and D. R. Whitehead (Systematic Entomology Laboratory SEA, USDA) for critical reviews. Habitus photos (Figs. 19–20) were taken by D. M. Anderson (Systematic Entomology Laboratory SEA, USDA). The study reported here was carried out at the USNM, and I thank the Department of Entomology, Smithsonian Institution, for providing working space, equipment, and access to the collections.

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